

# Администрирование сетевых подсистем

## Лабораторная работа №3

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Авдадаев Джамал Геланиевич

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Российский университет дружбы народов, Москва, Россия

## Цели и задачи работы

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## Цель лабораторной работы

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Приобретение практических навыков по установке, конфигурированию и интеграции DHCP-сервера Kea с DNS-сервером Bind9, включая настройку динамических обновлений DDNS.

## Ход выполнения

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# Установка DHCP-сервера Kea

```
transaction test succeeded.
Running transaction
Preparing      : 1/1
Installing    : mariadb-connector-c-config-3.4.4-1.el10.noarch 1/6
Installing    : mariadb-connector-c-3.4.4-1.el10.x86_64 2/6
Installing    : log4cplus-2.1.1-8.el10.x86_64 3/6
Installing    : libpq-16.8-2.el10_0.x86_64 4/6
Installing    : kea-libs-3.0.1-2.el10_1.x86_64 5/6
Running scriptlet: kea-3.0.1-2.el10_1.x86_64 6/6
Installing    : kea-3.0.1-2.el10_1.x86_64 6/6
Running scriptlet: kea-3.0.1-2.el10_1.x86_64 6/6

Installed:
  kea-3.0.1-2.el10_1.x86_64          kea-libs-3.0.1-2.el10_1.x86_64
  libpq-16.8-2.el10_0.x86_64        log4cplus-2.1.1-8.el10.x86_64
  mariadb-connector-c-3.4.4-1.el10.x86_64 mariadb-connector-c-config-3.4.4-1.el10.noarch

Complete!
[root@server.dgavdadaev.net ~]# cp /etc/kea/kea-dhcp4.conf /etc/kea/kea-dhcp4.conf_$(date -I)
[root@server.dgavdadaev.net ~]#
```

Рис. 1: Установка DHCP

# Резервное копирование конфигурации

The screenshot shows a terminal window with the file 'kea-dhcp4.conf' open. The file is located at '/etc/kea'. The code in the file is a JSON configuration for a DHCPv4 server. It includes sections for domain-name-servers, domain-search, and other options like lease times and subnet definitions. The configuration uses both numerical codes and names for options like 'domain-name' (code 15) and 'domain-search' (code 103). The terminal interface has tabs for 'Open' and '+', and a status bar at the bottom.

```
// {  
//   "name": "domain-name-servers",  
//   "code": 6,  
//   "csv-format": "true",  
//   "space": "dhcp4",  
//   "data": "192.0.2.1, 192.0.2.2"  
// }  
// but it's a lot of writing, so it's easier to do this instead:  
{  
  "name": "domain-name-servers",  
  152  "data": "192.168.1.1"  
},  
154  
155 // Typically people prefer to refer to options by their names, so they  
156 // don't need to remember the code names. However, some people like  
157 // to use numerical values. For example, option "domain-name" uses  
158 // option code 15, so you can reference to it either by  
159 // "name": "domain-name" or "code": 15.  
160 {  
  "code": 15,  
  "data": "dgavdadaev.net"  
},  
164  
165 // Domain search is also a popular option. It tells the client to  
166 // attempt to resolve names within those specified domains. For  
167 // example, name "foo" would be attempted to be resolved as  
168 // foo.mydomain.example.com and if it fails, then as foo.example.com  
169 {  
  "name": "domain-search",  
  "data": "dgavdadaev.net"  
},  
172  
--
```

# Настройка DNS-параметров

```
Open      kea-dhcp4.conf
          /etc/kea

142    // {
143    //   "name": "domain-name-servers",
144    //   "code": 6,
145    //   "csv-format": "true",
146    //   "space": "dhcp4",
147    //   "data": "192.0.2.1, 192.0.2.2"
148    // }
149    // but it's a lot of writing, so it's easier to do this instead:
150    {
151      "name": "domain-name-servers",
152      "data": "192.168.1.1"
153    },
154
155    // Typically people prefer to refer to options by their names, so they
156    // don't need to remember the code names. However, some people like
157    // to use numerical values. For example, option "domain-name" uses
158    // option code 15, so you can reference to it either by
159    // "name": "domain-name" or "code": 15.
160    {
161      "code": 15,
162      "data": "dgavdadaev.net"
163    },
164
165    // Domain search is also a popular option. It tells the client to
166    // attempt to resolve names within those specified domains. For
167    // example, name "foo" would be attempted to be resolved as
168    // foo.mydomain.example.com and if it fails, then as foo.example.com
169    {
170      "name": "domain-search",
171      "data": "dgavdadaev.net"
172    },
173
```

## Настройка подсети DHCP

```
284
285 // Below an example of a simple IPv4 subnet declaration. Uncomment to enable
286 // it. This is a list, denoted with [ ], of structures, each denoted with
287 // { }. Each structure describes a single subnet and may have several
288 // parameters. One of those parameters is "pools" that is also a list of
289 // structures.
290 "subnet4": [
291     {
292         "id": 1,
293
294         "subnet": "192.168.1.0/24",
295
296         "pools": [ { "pool": "192.168.1.30 - 192.168.1.199" } ],
297
298         "option-data": [
299             {
300                 "name": "routers",
301                 "data": "192.168.1.1"
302             }
303         ]
304         // You can add more subnets there.
305     }
306 ],
307
308 // There are many, many more parameters that DHCPv4 server is able to use.
309 // They were not added here to not overwhelm people with too much
310 // information at once
```

Рис. 4: Настройка подсети

## Проверка и активация DHCP

```
[root@server.dgavdadaev.net ~]# kea-dhcp4 -t /etc/kea/kea-dhcp4.conf
2025-11-26 07:34:34.296 WARN [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_MT_DISABLED_QUEUE_CONTROL disabling
dhcp queue control when multi-threading is enabled.
2025-11-26 07:34:34.296 WARN [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCP4_RESERVATIONS_LOOKUP_FIRST_ENABLED Multi
-threading is enabled and host reservations lookup is always performed first.
2025-11-26 07:34:34.296 INFO [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_CFGMGR_NEW_SUBNET4 a new subnet has
been added to configuration: 192.168.1.0/24 with params: t1=900, t2=1800, valid-lifetime=3600
2025-11-26 07:34:34.296 INFO [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_CFGMGR_SOCKET_TYPE_SELECT using soc
ket type raw
2025-11-26 07:34:34.296 INFO [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_CFGMGR_ADD_IFACE listening on inter
face eth1
2025-11-26 07:34:34.296 INFO [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_CFGMGR_SOCKET_TYPE_DEFAULT "dhcp-so
cket-type" not specified , using default socket type raw
2025-11-26 07:34:34.296 INFO [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_LEASE_MGR_BACKENDS_REGISTERED the f
ollowing lease backend types are available: memfile
2025-11-26 07:34:34.296 INFO [kea-dhcp4.hosts/106602.139998790281344] HOSTS_BACKENDS_REGISTERED the following host
backend types are available:
2025-11-26 07:34:34.296 INFO [kea-dhcp4.dhcpsrv/106602.139998790281344] DHCPSRV_FORENSIC_BACKENDS_REGISTERED the fo
llowing forensic backend types are available:
2025-11-26 07:34:34.296 INFO [kea-dhcp4.database/106602.139998790281344] CONFIG_BACKENDS_REGISTERED the following c
onfig backend types are available:
[root@server.dgavdadaev.net ~]#
[root@server.dgavdadaev.net ~]# systemctl --system daemon-reload
[root@server.dgavdadaev.net ~]# systemctl enable kea-dhcp4.service
Created symlink '/etc/systemd/system/multi-user.target.wants/kea-dhcp4.service' → '/usr/lib/systemd/system/kea-dhcp4
.service'.
[root@server.dgavdadaev.net ~]#
```

Рис. 5: Проверка kea-dhcp4

## Настройка DNS

---

## Прямая зона

The screenshot shows a window titled "dgavdadaev.net" with the path "/var/named/master/fz". The window contains a text area with the following DNS zone configuration:

```
1 $TTL 1D
2 @      IN SOA  @ server.dgavdadaev.net. (
3                                2025112600 ; serial
4                                1D      ; refresh
5                                1H      ; retry
6                                1W      ; expire
7                                3H )   ; minimum
8      NS      @
9      A       192.168.1.1
10 $ORIGIN dgavdadaev.net.
11 server A       192.168.1.1
12 ns    A       192.168.1.1
13 dhcp  A       192.168.1.1
```

Рис. 6: Прямая зона DNS

## Обратная зона

The screenshot shows a window titled '192.168.1' with the path '/var/named/master/rz'. The window contains the following DNS zone configuration:

```
1 $TTL 1D
2 @      IN SOA  @ server.dgavdadaev.net. (
3                               2025112600      ; serial
4                               1D      ; refresh
5                               1H      ; retry
6                               1W      ; expire
7                               3H )    ; minimum
8     NS      @
9     A       192.168.1.1
10    PTR     server.dgavdadaev.net.
11 $ORIGIN 1.168.192.in-addr.arpa.
12 1    PTR     server.dgavdadaev.net.
13 1    PTR     ns.dgavdadaev.net.
14 1    PTR     dhcp.dgavdadaev.net.
```

Рис. 7: Обратная зона DNS

## Проверка резолвинга

```
[root@server.dgavdadaev.net ~]#  
[root@server.dgavdadaev.net ~]# systemctl restart named  
[root@server.dgavdadaev.net ~]# ping dhcp.dgavdadaev.net  
PING dhcp.dgavdadaev.net (192.168.1.1) 56(84) bytes of data.  
64 bytes from server.dgavdadaev.net (192.168.1.1): icmp_seq=1 ttl=64 time=0.015 ms  
64 bytes from server.dgavdadaev.net (192.168.1.1): icmp_seq=2 ttl=64 time=0.116 ms  
64 bytes from server.dgavdadaev.net (192.168.1.1): icmp_seq=3 ttl=64 time=0.181 ms  
64 bytes from server.dgavdadaev.net (192.168.1.1): icmp_seq=4 ttl=64 time=0.097 ms  
64 bytes from server.dgavdadaev.net (192.168.1.1): icmp_seq=5 ttl=64 time=0.029 ms  
^C  
--- dhcp.dgavdadaev.net ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 4226ms  
rtt min/avg/max/mdev = 0.015/0.087/0.181/0.060 ms  
[root@server.dgavdadaev.net ~]#
```

Рис. 8: ping dhcp

## Настройка firewall и SELinux

```
[root@server.dgavdadaev.net ~]# firewall-cmd --add-service=dhcp
success
[root@server.dgavdadaev.net ~]# firewall-cmd --add-service=dhcp --permanent
success
[root@server.dgavdadaev.net ~]# restorecon -vR /etc
[root@server.dgavdadaev.net ~]# restorecon -vR /var/named/
[root@server.dgavdadaev.net ~]# restorecon -vR /var/lib/kea/
[root@server.dgavdadaev.net ~]# systemctl start kea-dhcp4.service
[root@server.dgavdadaev.net ~]#
```

Рис. 9: firewall + SELinux

## Настройка DHCP-клиента

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## Скрипт маршрутизации

```
1  #!/bin/bash
2  echo "Provisioning script $0"
3  nmcli connection modify "eth1" ipv4.gateway "192.168.1.1"
4  nmcli connection up "eth1"
5  nmcli connection modify eth0 ipv4.never-default true
6  nmcli connection modify eth0 ipv6.never-default true
7  nmcli connection down eth0
8  nmcli connection up eth0
9  # systemctl restart NetworkManager
10
```

Рис. 10: routing script

## Получение адреса клиентом

```
dgavdadaev@client:~  
+  
  
RX packets 1915 bytes 229512 (224.1 KiB)  
RX errors 0 dropped 0 overruns 0 frame 0  
TX packets 1637 bytes 266407 (260.1 KiB)  
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
      inet 192.168.1.30 netmask 255.255.255.0 broadcast 192.168.1.255  
      inet6 fe80::6e0e:3d13:99e9:4e78 prefixlen 64 scopeid 0x20<link>  
        ether 08:00:27:39:31:a4 txqueuelen 1000 (Ethernet)  
          RX packets 13 bytes 2717 (2.6 KiB)  
          RX errors 0 dropped 0 overruns 0 frame 0  
          TX packets 177 bytes 17546 (17.1 KiB)  
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536  
      inet 127.0.0.1 netmask 255.0.0.0  
      inet6 ::1 prefixlen 128 scopeid 0x10<host>  
        loop txqueuelen 1000 (Local Loopback)  
          RX packets 17 bytes 2068 (2.0 KiB)  
          RX errors 0 dropped 0 overruns 0 frame 0  
          TX packets 17 bytes 2068 (2.0 KiB)  
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Рис. 11: ifconfig eth1

## Настройка DDNS

---

## Генерация TSIG-ключа

```
[root@server.dgavdadaev.net ~]#  
[root@server.dgavdadaev.net ~]# mkdir -p /etc/named/keys  
[root@server.dgavdadaev.net ~]# tsig-keygen -a HMAC-SHA512 DHCP_UPDATER > /etc/named/keys/dhcp_updater.key  
[root@server.dgavdadaev.net ~]# cat /etc/named/keys/dhcp_updater.key  
key "DHCP_UPDATER" {  
    algorithm hmac-sha512;  
    secret "04w6oANM7B41CKBp8kq6nmvI7wN0im9HvvV16InodYMS8Glmcl7kG0J6Rl02ivGMcBFuMdubSPwZVXXWgGTtzA==";  
};  
[root@server.dgavdadaev.net ~]# chown -R named:named /etc/named/keys/  
[root@server.dgavdadaev.net ~]#
```

Рис. 12: TSIG key

# Настройка update-policy в Bind9

```
*dgavdadaev.net
/etc/named
Save  ⋮

1 // named.rfc1912.zones:
2 //
3 // Provided by Red Hat caching-nameserver package
4 //
5 // ISC BIND named zone configuration for zones recommended by
6 // RFC 1912 section 4.1 : localhost TLDs and address zones
7 // and https://tools.ietf.org/html/rfc6303
8 // (c)2007 R W Franks
9 //
10 // See /usr/share/doc/bind*/sample/ for example named configuration files.
11 //
12 // Note: empty-zones-enable yes; option is default.
13 // If private ranges should be forwarded, add
14 // disable-empty-zone "."; into options
15 //
16
17 zone "dgavdadaev.net" IN {
18     type master;
19     file "master/fz/dgavdadaev.net";
20     update-policy {
21         grant DHCP_UPDATER wildcard *.dgavdadaev.net A DHCID;
22     };
23 };
24
25 zone "1.168.192.in-addr.arpa" IN {
26     type master;
27     file "master/rz/192.168.1";
28     update-policy {
29         grant DHCP_UPDATER wildcard *.1.168.192.in-addr.arpa PTR DHCID;
30     };
31 };

15/24
```

## Файл tsig-keys.json



The screenshot shows a text editor window titled "tsig-keys.json" located in the "/etc/kea" directory. The window has standard operating system controls at the top: Open, Save, and Close. The code is displayed in a monospaced font with line numbers on the left:

```
1 "tsig-keys": [  
2 {  
3     "name": "DHCP_UPDATER",  
4     "algorithm": "hmac-sha512",  
5     "secret": "04w6oANM7B41CKBp8kq6nmvI7wN0im9HvvV16InodYMS8Glmcl7kG0J6Rl02ivGMcBFuMdubSPwZVXXWgGTtzA=="  
6 }  
7 ]
```

Рис. 14: tsig JSON

# Настройка kea-dhcp-ddns

The screenshot shows a code editor window with the title bar "kea-dhcp-ddns.conf" and the path "/etc/kea". The editor has a toolbar with "Open" and a dropdown menu. The main area displays a JSON configuration file for Kea. The configuration includes sections for forward and reverse DNS update domains, each with specific names, key names, and DNS server addresses.

```
21 {
22     "ip-address": "127.0.0.1",
23     "port": 53001,
24     "control-socket": {
25         "socket-type": "unix",
26         "socket-name": "/run/kea/kea-ddns-ctrl-socket"
27     },
28     <?include "/etc/kea/tsig-keys.json" ?>
29
30     "forward-ddns": {
31         "ddns-domains": [
32             {
33                 "name": "dgavdadaev.net.",
34                 "key-name": "DHCP_UPDATER",
35                 "dns-servers": [
36                     { "ip-address": "192.168.1.1" }
37                 ]
38             }
39         ]
40     },
41
42     "reverse-ddns": {
43         "ddns-domains": [
44             {
45                 "name": "1.168.192.in-addr.arpa.",
46                 "key-name": "DHCP_UPDATER",
47                 "dns-servers": [
48                     { "ip-address": "192.168.1.1" }
49                 ]
50             }
51         ]
52     },
53 }
```

## Статус службы Kea DDNS

```
[root@server.dgavdadaev.net ~]# kea-dhcp-ddns -t /etc/kea/kea-dhcp-ddns.conf
2025-11-26 07:58:47.077 INFO [kea-dhcp-ddns.dctl/110367.140315119093632] DCTL_CONFIG_COMPLETE server has completed configuration check: listening on 127.0.0.1, port 53001, using UDP, result: success(0), text=Configuration check successful
[root@server.dgavdadaev.net ~]# systemctl enable --now kea-dhcp-ddns.service
Created symlink '/etc/systemd/system/multi-user.target.wants/kea-dhcp-ddns.service' → '/usr/lib/systemd/system/kea-dhcp-ddns.service'.
[root@server.dgavdadaev.net ~]# systemctl status kea-dhcp-ddns.service
● kea-dhcp-ddns.service - Kea DHCP-DDNS Server
    Loaded: loaded (/usr/lib/systemd/system/kea-dhcp-ddns.service; enabled; preset: disabled)
      Active: active (running) since Wed 2025-11-26 07:59:18 UTC; 7s ago
        Invocation: 28254c1f5ca74f9da46e1e81c99e1041
          Docs: man:kea-dhcp-ddns(8)
       Main PID: 110616 (kea-dhcp-ddns)
         Tasks: 5 (limit: 10381)
        Memory: 2.2M (peak: 7M)
         CPU: 12ms
        CGroup: /system.slice/kea-dhcp-ddns.service
                  └─110616 /usr/sbin/kea-dhcp-ddns -c /etc/kea/kea-dhcp-ddns.conf

Nov 26 07:59:18 server.dgavdadaev.net systemd[1]: Started kea-dhcp-ddns.service - Kea DHCP-DDNS Server.
Nov 26 07:59:18 server.dgavdadaev.net kea-dhcp-ddns[110616]: 2025-11-26 07:59:18.474 INFO [kea-dhcp-ddns.dctl/110616] COMMAND_ACCEPTOR_START Starting to accept connections
Nov 26 07:59:18 server.dgavdadaev.net kea-dhcp-ddns[110616]: INFO DCTL_CONFIG_COMPLETE server has completed configuration check
Nov 26 07:59:18 server.dgavdadaev.net kea-dhcp-ddns[110616]: INFO DHCP_DDNS_STARTED Kea DHCP-DDNS server version 3.0.0
lines 1-17/17 (END)
```

Рис. 16: kea-dhcp-ddns.service

# Разрешение DDNS в Kea DHCP

The screenshot shows a code editor window with the title 'kea-dhcp4.conf' and the path '/etc/kea'. The file contains configuration for a Kea DHCPv4 server. The code is color-coded, with comments in blue and configuration keys in purple. A cursor is visible at line 49, which contains the key 'ddns-override-client-update': true. The file includes sections for network interfaces, DHCPv4 server behavior, and control channel management.

```
26 // DHCPv4 configuration starts here. This section will be read by DHCPv4 server
27 // and will be ignored by other components.
28 "Dhcp4": {
29     // Add names of your network interfaces to listen on.
30     "interfaces-config": {
31         // See section 8.2.4 for more details. You probably want to add just
32         // interface name (e.g. "eth0" or specific IPv4 address on that
33         // interface name (e.g. "eth0/192.0.2.1").
34         "interfaces": [ "eth1" ]
35
36         // Kea DHCPv4 server by default listens using raw sockets. This ensures
37         // all packets, including those sent by directly connected clients
38         // that don't have IPv4 address yet, are received. However, if your
39         // traffic is always relayed, it is often better to use regular
40         // UDP sockets. If you want to do that, uncomment this line:
41         // "dhcp-socket-type": "udp"
42     },
43
44     "dhcp-ddns": {
45         "enable-updates": true
46     },
47
48     "ddns-qualifying-suffix": "dgavdadaev.net",
49     "ddns-override-client-update": true,
50     // Kea supports control channel, which is a way to receive management
51     // commands while the server is running. This is a Unix domain socket that
52     // receives commands formatted in JSON, e.g. config-set (which sets new
53     // configuration), config-reload (which tells Kea to reload its
54     // configuration from file), statistic-get (to retrieve statistics) and many
55     // more. For detailed description, see Sections 8.8, 16 and 15.
56     "control-socket": {
57         "socket-type": "unix",
58         "socket-name": "kea4-ctrl-socket"
59     }
60 }
```

## Перезапуск DHCP

```
[root@server.dgavdadaev.net ~]# systemctl restart kea-dhcp4.service
[root@server.dgavdadaev.net ~]# systemctl status kea-dhcp4.service
● kea-dhcp4.service - Kea DHCPv4 Server
    Loaded: loaded (/usr/lib/systemd/system/kea-dhcp4.service; enabled; preset: disabled)
    Active: active (running) since Wed 2025-11-26 08:02:40 UTC; 11s ago
      Invocation: 946c493824fc43bfa12e283ab5e2d642
        Docs: man:kea-dhcp4(8)
     Main PID: 111176 (kea-dhcp4)
       Status: "Dispatching packets..."
        Tasks: 7 (limit: 10381)
      Memory: 2.5M (peak: 6.9M)
        CPU: 14ms
      CGroup: /system.slice/kea-dhcp4.service
              └─111176 /usr/sbin/kea-dhcp4 -c /etc/kea/kea-dhcp4.conf

Nov 26 08:02:40 server.dgavdadaev.net systemd[1]: Starting kea-dhcp4.service - Kea DHCPv4 Server...
Nov 26 08:02:40 server.dgavdadaev.net kea-dhcp4[111176]: 2025-11-26 08:02:40.884 INFO [kea-dhcp4.dhcp4/111176.1406]
Nov 26 08:02:40 server.dgavdadaev.net kea-dhcp4[111176]: 2025-11-26 08:02:40.885 INFO [kea-dhcp4.commands/111176.1]
Nov 26 08:02:40 server.dgavdadaev.net systemd[1]: Started kea-dhcp4.service - Kea DHCPv4 Server.
lines 1-17/17 (END)
```

Рис. 18: restart kea-dhcp4

## Проверка DDNS

---

## Проверка записи клиента через dig

```
[dgavdadaev@client.dgavdadaev.net ~]$ dig @192.168.1.1 client.dgavdadaev.net  
  
; <>> DiG 9.18.33 <>> @192.168.1.1 client.dgavdadaev.net  
; (1 server found)  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 18362  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 1232  
; COOKIE: acd231d3713d7f98010000006926b48e2c8633fe55fc21f6 (good)  
;; QUESTION SECTION:  
;client.dgavdadaev.net. IN A  
  
;; ANSWER SECTION:  
client.dgavdadaev.net. 1200 IN A 192.168.1.30  
  
;; Query time: 0 msec  
;; SERVER: 192.168.1.1#53(192.168.1.1) (UDP)  
;; WHEN: Wed Nov 26 08:04:31 UTC 2025  
;; MSG SIZE rcvd: 94  
  
[dgavdadaev@client.dgavdadaev.net ~]$
```

Рис. 19: dig client

## Подготовка provisioning

---

## Копирование конфигураций DHCP/DNS

```
[root@server.dgavdadaev.net ~]#
[root@server.dgavdadaev.net ~]# cd /vagrant/provision/server/
[root@server.dgavdadaev.net server]# mkdir -p /vagrant/provision/server/dhcp/etc/kea
[root@server.dgavdadaev.net server]# cp -R /etc/kea/* /vagrant/provision/server/dhcp/etc/kea
[root@server.dgavdadaev.net server]#
[root@server.dgavdadaev.net server]# cp -R /var/named/* /vagrant/provision/server/dns/var/named/
cp: overwrite '/vagrant/provision/server/dns/var/named/master/rz/192.168.1'? y
cp: overwrite '/vagrant/provision/server/dns/var/named/master/fz/dgavdadaev.net'? y
[root@server.dgavdadaev.net server]# y
bash: y: command not found...
[root@server.dgavdadaev.net server]# cp -R /etc/named/* /vagrant/provision/server/dns/etc/named/
cp: overwrite '/vagrant/provision/server/dns/etc/named/dgavdadaev.net'? y
[root@server.dgavdadaev.net server]# touch dhcp.sh
[root@server.dgavdadaev.net server]#
```

Рис. 20: provisioning copy

## Скрипт автоматической настройки

```
1  #!/bin/bash
2  echo "Provisioning script $0"
3  echo "Install needed packages"
4  dnf -y install kea
5  echo "Copy configuration files"
6  cp -R /vagrant/provision/server/dhcp/etc/kea/* /etc/kea/
7  echo "Fix permissions"
8  chown -R kea:kea /etc/kea
9  chmod 640 /etc/kea/tsig-keys.json
10 restorecon -vR /etc
11 restorecon -vR /var/lib/kea
12 echo "Configure firewall"
13 firewall-cmd --add-service dhcp
14 firewall-cmd --add-service dhcp --permanent
15 echo "Start dhcpcd service"
16 systemctl --system daemon-reloadsystemctl enable --now kea-dhcp4.service
17 systemctl enable --now kea-dhcp-ddns.service
```

Рис. 21: dhcp.sh

## Выводы

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## Итог лабораторной работы

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В ходе работы был установлен и настроен DHCP-сервер Kea, интегрированный с Bind9 для динамических DNS-обновлений.

Созданы TSIG-ключи, настроены правила обновления прямой и обратной зоны, включено автоматическое формирование A и PTR-записей.

Проверено получение адреса клиентом и корректное появление DNS-записей.

Структура provisioning подготовлена для автоматизации развёртывания стенда.